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THE STEREOGRAPH AS A VISUAL AID

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The benefits of education and of useful knowledge, generally diffused through a community, are essential to the preservation of a free government.

Sam Houston

Cultivated mind is the guardian genius of democracy. . . . It is the only dictator that freemen acknowledge and the only security that freemen desire.

Mirabeau B. Lamar

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INTRODUCTION

Photography, like printing, is now one of the practical arts; and visual aids are an instrument of civilization just as books are. By visual aids we mean maps, charts, graphs, diagrams, art prints, photographs, *stereographs,* lantern slides, and moving pictures. With these may also be classed the more realistic models and museum exhibits.

This bulletin has a two-fold mission: (1) to present some important psychological truths regarding the value of the stereograph as an aid in the learning process, and (2) to offer a few practical suggestions as to its most effective use in connection with the daily school work. The two aims will be taken up under the headings *Psychological Principles* and the *Maple Sugar Industry.*

PSYCHOLOGICAL PRINCIPLES

The Principle of Self-Activity. Telling does not effect learning; neither does the mere showing of pictures. Both telling and showing are simply sensory stimuli, one to the ear and the other to the eye; and, while they are very helpful in stimulating thinking, they constitute only a minor step in the learning process. The major step is something different—it involves aggressiveness. Children learn primarily by physical reactions to environmental stimuli or by mental responses to challenging situations, or both—in short, by *adaptive self-activity.* For example, they learn how to tie knots not merely by being told how or by watching someone else tie them, but actually by trying to tie knots and succeeding several times until the habits have

become fixed. In a similar manner, they do not learn to know what honesty means by being merely told or shown the word. They must go through a variety of challenging experiences themselves before the meaning of honesty finally dawns upon them. Children learn mainly by doing.

Self-Activity Must Issue from an Internal Purpose. But this self-activity, as is implied in the word "adaptive," must have an end, aim, or purpose to guide the process of adaptation. There must be an internal motive to tug the learner toward a definite goal. There must be a genuine interest, manifesting itself in a desire to accomplish something. Accordingly, if learning is to be effected in the most economical manner, the pupil must be deeply interested in the topic to be learned; he must be imbued with a definite purpose to master the subject matter; and he must be thrilled with visions of conscious struggle and intellectual conquest. To be concretely specific, as an illustration, the pupil must plainly "ache to know all about the maple sugar industry."

The Function of Experience. Psychologically the function of experience is to initiate and strengthen neural connections between the situations which life presents to a human being and the specific responses which he makes to these situations. For instance, life presents to the little boy green apples; he eats his fill—and acquires a vivid memory. The experience forms neural connections between green apples and their consequences and thus effects a severe bit of new learning. Henceforth the boy may regard green apples with misgivings. In a similar manner, life, in the form of playmates, presents baseball to him; he participates, and enjoys the sport. And again experience effects new learning, but in this case highly satisfying. In the life of every other human being, experience is the real teacher. *Experience forms the basis of all learning.*

Vicarious Experience. There are two kinds of experience, the actual or *real* and the make-believe or *vicarious.* Learning to leave green apples alone is commonly the result of a real experience. Learning to avoid poison, on the

other hand, is almost always the result of a vicarious experience. For instance, we hear of some person who died from a draught of poison. Then we contemplate the possibility of having drunk poison ourselves, writhing in agony, and dying; following which, we firmly resolve to exercise the greatest caution or abstain entirely. The example just mentioned is one which, from the standpoint of type of experience, may be termed auditory vicarious. Another and far commoner type is the *visual* vicarious, of which we have legion. Comprehending a scene projected upon the motion picture screen constitutes a visual vicarious experience. But the motion picture screen is not the only medium which effects such vicarious experiences. Any photograph or other realistic representation has that power. In fact, the most nearly realistic visual experience is the one we attain when we gaze at a double photograph through what is known as the stereoscope. See Figure 1.

The Stereograph. The double picture shown in Figure 1 is called a stereograph. Contrary to appearance, the two

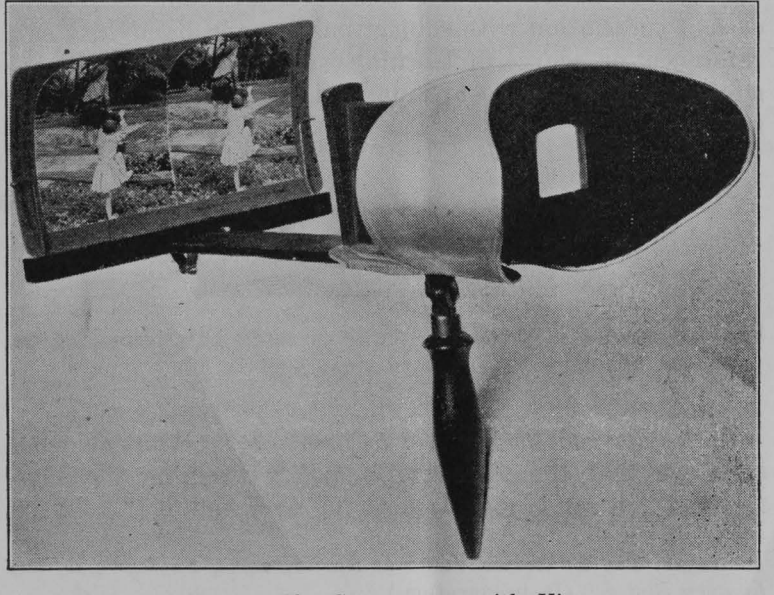

Fig. 1. The Stereoscope, with View

similar halves are not identical. One is just a little different from the other. In making the stereograph, two views of a scene are photographed at one time by means of a "two-eyed" or bifocal camera. Really two cameras are used. They are built into a single frame, with the two focal openings about three inches apart, just a little more than the width between two ordinary human eyes. When the slightly divergent prints are later mounted on a card and viewed through the stereoscope, we see the scene elements in their true relationship, just as they would have appeared to us had we stood where the bifocal camera was when the picture was snapped. Instead of two separate photographs, we see apparently the actual scene, with some of the objects in the foreground, others behind them, and still others in the distance. The stereograph is the only photographic medium, practical so far, which effects the illusion of perspective, solidity, and reality.

Advantages. When seen through the stereoscope, the stereograph produces a pleasing and compelling illusion of frozen reality. In addition to depth, it has also the advantages of durability, low cost, freedom from distraction, ease of correlation with subject matter, and handy use as a reference, or source of learning. It is my belief that the stereograph is the best visual aid for solitary individual study.

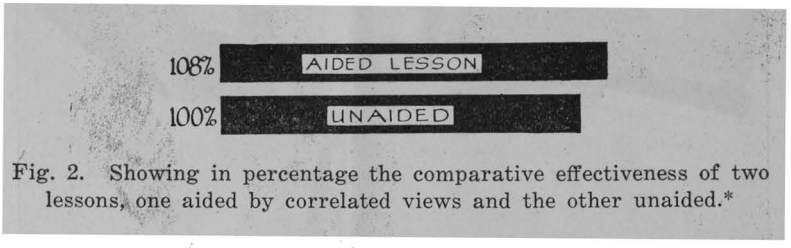

Fig. 2. Showing in percentage the comparative effectiveness of two lessons, one aided by correlated views and the other unaided.*

Is the Stereograph an Aid to Learning? What evidence have we that the stereograph makes teaching more effective? In reply, may I quote my own findings? An ex-

*Weber, *The Educative Value of Stereographs, Photographs, and Lantern Slides.* (In preparation.)

perimental study conducted at Lawrence, Kansas, in 1921-1922, with approximately 150 pupils from grades 3 to 6, conclusively demonstrates the fact that the use of correlated views with certain lessons on the manufacture of glass bottles and manila hemp rope increases the effectiveness of instruction by about 8 per cent. There are at least five reasons for this gain: in a visually aided lesson, the pupils are *more interested* in the topic, they learn the facts in *less time,* they do it with *less effort,* the learning is *more vivid,* and the results *endure longer.* See Figure 2.

Ignorance of Method. Very few teachers, however, seem to know how to use the stereograph. Many methods have been advocated; but most of them are wrong in principle. They are usually hopeless attempts to make the study of the stereograph a routine group activity. This is a waste of time and effort for at least two good reasons: (1) we have a better aid for group instruction in the lantern slide; and (2) there is a conflict of attention and interests in the teacher's untimely commands, "Change scopes," when the pupil is reveling in a fairyland of illusion. Only directive and suggestive remarks or questions can assist the pupil in his observation, and these had better appear in print on the stereograph or on the blackboard or precede the inspection orally.

A Suggestion. Probably the best method of using the stereograph is to place it with two or three stereoscopes on a table in the corner of the classroom or in the library, where it can be consulted as a reference, just like the dictionary, the encyclopedia, or any other source. The teacher may lay out a few correlated views for each lesson, or better, a pupil or two may be given the privilege of selecting them for the use of the class. Any member of the class who goes to the table, then, to look at the stereographs will have an inner motive for his act. *In accordance with the principles of purpose and self-activity, this method of procedure creates a vicarious experience which effects learning in the quickest, easiest, and most satisfying manner.*

THE MAPLE SUGAR INDUSTRY

The stereograph shown in Figure 3 can be made the basis of a series of lessons on the maple sugar industry.

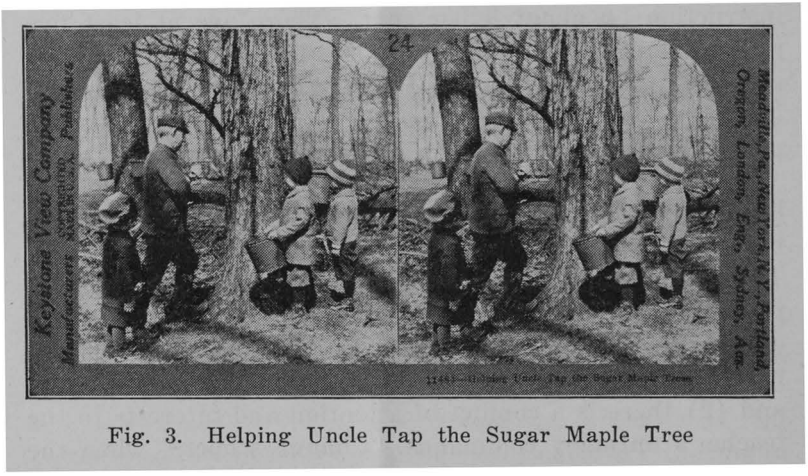

Fig. 3. Helping Uncle Tap the Sugar Maple Tree

Three different uses are herewith suggested:

(1) Language Lesson in Grade III;
(2) Nature Study Lesson in Grade IV;
(3) Geography Lesson in Grade IV or V.

Suggestion No. 1. *Subject: Language.* *Grade III.*

Primary Aim: Proficiency in Language

Secondary Aims:

Acquiring imagery to put meaning into new words;
Enlarging and enriching the vocabulary;
Improving the sentence structure;
Organizing sentences into a paragraph;
Increasing facility of thoughtful expression.

Preliminary. The class is approaching the study of the maple sugar industry. The day before the topic is taken up in recitation form, the teacher lays out for reference

Stereograph No. 24* (see Fig. 3). Throughout the day the pupils, with their curiosity aroused, in turn examine and study the picture in the light of questions which the teacher asked when she put out the stereograph, such as, "Why is that man driving something into a tree?" Etc . . .

Method of the Recitation

Teacher: How many children have looked at the picture which shows "uncle tapping the sugar maple tree"?

Pupils raise hands enthusiastically. One is chosen by the teacher.

Teacher: What did you see in the picture? . . . Mary?

Mary: A man boring a hole in the tree, and some children with buckets, and some buckets hanging on the tree, and—

Teacher (interrupting): Why does the man bore a hole in the tree? . . . James?

James: To drive in a spout, to let—something come out.

Teacher: Why does he drive in a spout? . . . George?

George: To—(embarrassed silence. Vocabulary lacking.)

Teacher: What else do you see, George?

George: Children with buckets.

Teacher: A complete sentence, please.

George: The children carry buckets.

Teacher: What are the buckets for? . . . Frances?

Frances: To catch the—

Teacher: Yes, what? . . . Well, Helen?

Helen: Sap! (Vocabulary.)

Teacher: What is sap? . . . Frank?

Slowly and painstakingly the meaning of "sap" is acquired by the pupils and enriched—its response to warmth, its movement up the tree, its function in budding, etc.

In a similar manner, the sap is followed from the tree with the bucket to the boiling vat, where it is thickened to syrup and finally cooled to maple sugar. The pupil's imagery is clothed in language. Thought relationships

*From the Primary Set. Keystone View Company, Meadville, Pa.

are expressed in short, simple sentences. And these are then grouped into a coherent paragraph.

Teacher: Now, who can tell me the story of maple sugar in several sentences, and make it very interesting?

George: Maple sugar comes from maple trees. A man bores a hole in the tree. He drives a spout in the hole. He hangs a pail on the spout. The sap runs into the pail. Later the sap is boiled until it is thick syrup. Finally, when the syrup is cooled, it forms sugar. (Paragraph.)

Suggestion No. 2. Subject: Nature Study. Grade IV.

Primary Aim: Understanding of Natural Phenomena

Secondary Aims:

Stimulating powers of observation;
Mastering important facts in biology;
Giving adequate expression to new ideas;
Learning to appreciate the wonders of Nature.

Preliminary. The procedure here may be the same as that stated under Suggestion No. 1, except that the teacher's questions should direct the pupils' attention to the flow of the sap upward and the causes thereof, such as, "How does the sun call the sap?" Etc.

Method of the Recitation

Teacher: How many children here have even seen or felt sap under the bark of a tree?

Pupils wave hands eagerly. Ruth is given the floor.

Teacher: Ruth, how does it feel?

Ruth: It feels sticky.

Teacher: Is there more sap in the branches in one season of the year than in another? . . . Henry?

Henry: There is more sap in the summer.

Teacher: Why, Henry?

Henry is silent. Others volunteer.

Teacher: Yes, Fannie?

Fannie: Because it is warmer in the summer.

Teacher: But, what has that to do with the flow of sap?

Gradually the teacher leads her pupils to an understanding of the effect of warmth upon the flow of the sap. And in a similar manner she effects an understanding of the functions of sap in budding, leaf formation, and the production of chlorophyll. Etc.

Teacher: Now, children, are you ready to write up what you have learned in the form of a little story about sap?

These preliminary drafts should be revised in accordance with suggestions from the teacher and other pupils and then written neatly into a nature study notebook, together with pasted-in illustrations and drawings made by the pupils themselves during their observation periods.

Suggestion No. 3. Subject: Geography. Grade IV or V.

Primary Aim: Knowledge of the Earth in its Relation to Human Life

Secondary Aims:

Becoming acquainted with the maple sugar industry;
Getting a better conception of territorial products;
Extending the knowledge of general geographical facts.

Preliminary. The same as stated under Suggestion No. 1, except that the teacher's questions should aim toward an understanding of the maple sugar industry in its relation to the food supply, such as, "Where does our maple syrup come from? How is maple syrup made into maple sugar?" Etc.

Method of the Recitation

Teacher: How many here like maple syrup with their pancakes? Good! Now, how many know where maple syrup comes from?

Johnnie: Maple syrup comes from the sugar maple tree.

Teacher: If you boiled maple syrup down to a thick, sticky mass, and then let it cool; what would you have? . . . Mae?

Mae: You would then have pure maple sugar.

Teacher: Tell me in a paragraph how maple sugar is prepared.

When the origin and preparation of maple sugar are thoroughly understood by the class, the quizzing continues.

Teacher: Where does the sugar maple tree grow? . . . Jimmy?

Jimmy: In New Hampshire and Vermont, and in Ohio.

Teacher: Who can step to the map and point to a few places where the maple sugar industry flourishes? . . . Dorothy?

Teacher: What is maple sugar used for? . . . Irwin? Maybe I should have asked a little girl this question. Grace, do your folks use maple sugar in the house?

Grace: Mother uses it when she makes cookies.

Teacher: What other uses are there for maple sugar? Etc.

Teacher: Now, for tomorrow, you can clinch nearly all you have learned about the maple sugar industry today if you draw maple trees with buckets on your outline map. Then let me see your maps again.

Each pupil should be working up a products map of America on which are pasted illustrations or pupil drawings of the principal products of the separate states, provinces, or natural geographical divisions.

SUMMARY

1. A verbal lesson aided by correlated pictures effects more learning than the same lesson unaided.
2. Only one picture per day can be studied intensively and with distinct advantage to the pupils.
3. If other pictures are examined besides, they must be very closely related to it. Otherwise they detract.
4. While the stereograph does not readily lend itself to group instruction, it is the best visual aid we have for individual study by the learner.
5. The stereograph utilizes the principle of binocular vision. This creates an illusion of frozen reality.
6. Because of their realistic effect, stereographs have the power to provide visual vicarious experiences.
7. Vicarious experiences are almost as instructive as real experiences, which form the basis of all learning.
8. Children learn mainly through self-activity in response to challenging situations.
9. For most effective learning, self-activity must be actuated and guided by an internal purpose.
10. Visual aids promise to advance civilization.

REGISTRATION BLANK FOR STEREOGRAPH SERVICE

Place.....

Date.....

Division of Visual Instruction,
University Station,
Austin, Texas.

Gentlemen:—I inclose $1.00 as Registration Fee for your Stereograph Service during the present school year. Please send me complete Title List of Stereographs, together with the Regulations of the Division.

.....

Signature.

THE UNIVERSITY OF TEXAS

Bureau of Extension

1. **Rural School Service.** Lectures and rural school specialists are available for county school surveys, for lectures on school improvement, and for general assistance in directing and organizing community meetings.

2. **The Division of Extension Teaching.** Courses equivalent to those offered in residence at the University are taught by mail, by members of the University faculty. Extension classes are offered in those centers in the State where there is a demand for them. Group Study Courses are available for study clubs.

3. **The Division of Home Economics.** Conferences and clinics are held relative to the health and nutrition of children of pre-school age, as well as for children of school age. Budget making and budgetary spending are taught to groups where such service is desired.

4. **Division of Government Research.** Information relative to the problems of municipal, county, state, and national government may be had from this division.

5. **The Division of Package Loan Library.** This division collects material on all important present-day subjects and loans it, free of charge, to schools, women's clubs, libraries, community and civic organizations, and individuals. When demand for them arises, special libraries are often made up on subjects on which libraries are not already prepared.

6. **The Photographic Laboratory.** This laboratory is prepared to make lantern slides, produce negatives, and do technical photography. The laboratory is also prepared to make motion picture films.

7. **The Division of Trades and Industries.** Courses in trade analysis, lesson planning, methods of teaching, practical teaching, related subject work, and history of industrial education are given in industrial centers, by members of the division working in cooperation with the State Board for Vocational Education.

8. **The Division of Visual Instruction.** Lantern slide sets are distributed for educational and recreational purposes. Motion picture films are distributed through the division, and information relative to Extension service has been prepared and will be mailed free upon application.

9. **The University Interscholastic League.** Educational contests are promoted among the public schools of Texas in public speaking, essay-writing, and spelling. It is the purpose of the League also to assist in organizing, standardizing and controlling athletics. A bulletin for use in the spelling contests is issued, also one briefing the subject for debate and giving selected arguments, one of use in preparing contestants for the Music Memory contests, and one containing the Constitution and Rules including a thorough description of all the contests undertaken. Each member-school is entitled to a year's free subscription to *The Interscholastic Leaguer.*

"THE UNIVERSITY EXTENSION CAMPUS IS THE STATE OF TEXAS."

Address *general* inquiries to T. H. Shelby, Director, Bureau of Extension, University of Texas.

Address all inquiries relative to Stereographs, Lantern Slides, Moving Pictures, and Projection Equipment, to *Division of Visual Instruction, University Station, Austin, Texas.*